California Environmental Protection Agency
AIR RESOURCES BOARD

Executive Order G-70-177-AA

Modification of the Certification of the Hirt VCS400-7 Vacuum Assist Phase II Vapor Recovery System

WHEREAS, the California Air Resources Board ("the Board" or "CARB") has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, certification procedures for systems designed for the control of gasoline vapor emissions during motor vehicle fueling operations (Phase II vapor recovery systems) in its "Certification Procedure for Vapor Recovery Systems of Dispensing Facilities" ("Certification Procedures" or "CP-201") as last amended April 12, 1996, incorporated by reference into Title 17, California Code of Regulations, Section 94011;

WHEREAS, the Board has established, pursuant to California Health and Safety Code sections 39600, 39601 and 41954, test procedures for determining the compliance of Phase II vapor recovery systems with emission standards in its "Certification and Test Procedures for Vapor Recovery Systems," TP-201.1 through TP-201.6, ("Test Procedures") as adopted April 12, 1996 and last amended March 17, 1999, incorporated by reference into Title 17, California Code of Regulations, Section 94011;

WHEREAS, Gilbert Castro requested and was granted certification of the VCS400-7 bootless nozzle vapor recovery system ("VCS400-7 system") pursuant to the Certification and Test Procedures on April 8, 1997, by Executive Order G-70-177;

WHEREAS, Gilbert Castro, now identified as Hirt Combustion Engineers, Inc. ("Hirt"), requested modification of the VCS400-7 system certification to include more detail on alarm conditions;

WHEREAS, the Certification Procedures provide that the Executive Officer shall issue an order of certification if he or she determines that the vapor recovery system conforms to all of the applicable requirements set forth in the Certification Procedures;

WHEREAS, the modification to the VCS400-7 system has been evaluated pursuant to the Board's Certification and Test Procedures; and

WHEREAS, I, Michael P. Kenny, Air Resources Board Executive Officer, find that the VCS400-7 system conforms with all the requirements set forth in the Certification Procedures, and results in a vapor recovery system which is at least 95 percent effective for attendant and/or self-serve use at gasoline service stations when used in conjunction with a Phase I vapor recovery system which has been certified by the Board and meets the requirements contained in Exhibit 2 of this Order.

NOW, THEREFORE, IT IS HEREBY ORDERED that the VCS400-7 system when used with a CARB-certified Phase I system, as specified in Exhibits 1 and 2 of this Order, is certified to be at least 95 percent effective in attended and/or self-serve mode. **Compatibility of this system with the onboard vapor recovery systems ("ORVR") has not been**

evaluated to determine the emissions impact. Fugitive emissions which may occur when the underground storage tanks are under positive pressure have not been quantified and were not included in the calculation of system effectiveness. Exhibit 1 contains a list of the equipment certified for use with the VCS400-7 system. Exhibit 2 contains installation and performance specifications for the system. Exhibit 3 contains a procedure for verifying dispensing rate.

IT IS FURTHER ORDERED that the dispensing rate for installations with the VCS400-7 System shall not exceed ten (10.0) gallons per minute at any nozzle. This is consistent with the flowrate limitation imposed by United States Environmental Protection Agency as specified in the Title 40, Code of Federal Regulations, Part 80, section 80.22. Dispensing rate shall be verified as specified in Exhibit 3.

IT IS FURTHER ORDERED that compliance with the certification requirements and rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the State Fire Marshal's Office, and the Division of Occupational Safety and Health of the Department of Industrial Relations is made a condition of this certification.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The owner or operator of the installation shall conduct, and pass, an Air-to-Liquid Ratio test as specified in TP-201.5 no later than 60 days after startup and at least once in each twelve month period thereafter. The test results shall be made available to the local air pollution control or air quality management districts upon request within fifteen days after the tests are conducted, or within fifteen days of the request. Alternative test procedures may be used if determined by the Executive Officer, in writing, to yield comparable results.

IT IS FURTHER ORDERED that the VCS400-7 system, as installed, shall comply with the procedures and performance standards the test installation was required to meet during certification testing. If, in the judgment of the Executive Officer, a significant fraction of installations fail to meet the specifications of this certification, or if a significant portion of the vehicle population is found to have configurations which significantly impair the system's collection efficiency, the certification itself may be subject to modification, suspension or revocation.

IT IS FURTHER ORDERED that the certified VCS400-7 system shall, at a minimum, be operated in accordance with the manufacturer's recommended maintenance intervals and shall use the manufacturer's recommended operation, installation, and maintenance procedures.

IT IS FURTHER ORDERED that the certified VCS400-7 system shall be performance tested during installation for ability to dispense gasoline and collect vapors without difficulty, in the presence of the station manager or other responsible individual. The manufacturer shall provide to the station manager, owner or operator instructions in the proper use of the VCS400-7 system, its repair and maintenance, where system and/or component replacements can be readily obtained, and copies of CARB-approved VCS400-7 system installation and maintenance manuals to be maintained at the station. Revisions to the manuals are subject to approval by CARB.

IT IS FURTHER ORDERED that all nozzles approved for use with the VCS400-7 system shall be 100 percent performance checked at the factory, including checks of the integrity of the vapor and liquid path, as specified in Exhibit 2 of this Order, and of the proper functioning of all automatic shut-off mechanisms.

IT IS FURTHER ORDERED that each vapor blower shall be adjusted and 100 percent performance checked at the factory, including verification that the blower performance is within the range specified in Exhibit 2 of this Order.

IT IS FURTHER ORDERED that the certified VCS400-7 system shall be warranted by the manufacturer, in writing, to the ultimate purchaser and each subsequent purchaser, that the vapor recovery system is designed, built and equipped so as to conform at the time of original installation or sale and for at least one year thereafter with the applicable regulations and is free from defects in materials and workmanship which would cause the vapor recovery system to fail to conform with applicable regulations. The manufacturer shall provide copies of the manufacturer's warranty for the VCS400-7 system to the station manager, owner or operator. Hoses, nozzles and breakaway couplings shall be warranted to the ultimate purchaser as specified above for at least one year, or for the expected useful life, whichever is longer.

IT IS FURTHER ORDERED that any alteration of the equipment, parts, design, or operation of the systems certified hereby is prohibited, and deemed inconsistent with this certification, unless such alteration has been approved by the Executive Officer or his/her designee.

IT IS FURTHER ORDERED that the certification Executive Order G-70-177, issued April 8, 1997, is hereby superseded by this Executive Order.

Executed at Sacramento, California, this 9th day of December, 1999.

Michael P. Kenny
Executive Officer

Attachments

Executive Order G-70-177-AA

Exhibit 1
Hirt VCS400-7 System Equipment List

Component	Manufacturer / Model	State Fire Marshal Identification Number
Nozzles	OPW 11VA-29 (Figure 2C)	005:008:050
	OR Any bootless nozzle which has been CARB-certified specifically for use with the VCS400-7 system.	
Coaxial Hoses	Any CARB-certified coaxial hose listed in the current revision of Executive Order G-70-52.	
	OR Any coaxial hose CARB certified for use with the VCS400-7 system.	
Liquid Removal System	A liquid removal system which has been CARB-certified for use with standard coaxial nozzles and hoses is required for all fueling points. Liquid removal systems are listed in Executive Order G-70-52	
Processor Unit	Model #VCS400-7. Dual rate processor with Model # K12 nozzle mixing type bootless burner	004:015:002
	Also model #K14 Control Panel.	
Process Control Recorder	Monarch Instrument Data Chart® model #DC-1100-1A3-0 with Memory Card model MC512	
Pressure/Vacuum Valves	Hazlett H-PVB-1 Gold label (settings as specified below)	005:017:004
	OR Any P/V valve CARB-certified specifically for use with the VCS400-7 system, with the following pressure and vacuum settings, in inches water column (wc): Pressure: three plus or minus one-half inches (3.0 ± 0.5") water column. Vacuum: eight plus or minus two inches (8 ± 2") water column.	

Component	Manufacturer / Model	State Fire Marshal Identification Number
Blower	Gast Manufacturing Corporation model R1102C-20 Regenerative Blower	
Pressure Gauge	Vacuum 5 inches water column to 5 inches water column pressure as illustrated in diagram 2E	

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Exhibit 2

Specifications for the Hirt VCS400-7 System

Typical installation of the system is shown in Figure 2A.

1. Nozzles

1.1 Failure mode testing has demonstrated that significant blockage of the vapor collection holes in the spout adversely impacts the operation of the system, while blockage of some of the vapor collection holes has negligible effect on the operation of the system. Any OPW 11VA-29 nozzle which has fewer than 5 unblocked vapor collection holes is defective and shall be immediately removed from service.

1.2 .Replacement 11VA-29 nozzles, new or rebuilt, must include the stainless steel spout assembly. Spout kits for the field repair of the 11VA-29 nozzle must include the stainless steel assembly. *(Note: Existing OPW 11VA-29 nozzles in the field may use either a stainless steel or an aluminum spout)*

1.3 A leaking vapor valve in the nozzle may compromise the vapor recovery capabilities of the entire vapor recovery system; therefore, it is imperative that defective vapor valves be corrected as soon as practicable in order to minimize emissions.

The OPW nozzle has an integral vapor valve which prevents the loss of vapor from the underground storage tanks, ensures proper operation of the system and prevents the ingestion of air into the system. Any nozzle with a defective vapor valve shall be immediately removed from service. The integrity of the system shall be restored by replacing the nozzle or otherwise closing the vapor path as soon as practicable.

1.4 Nozzles shall be 100 percent performance checked at the factory, including checks of all shutoff mechanisms and of the integrity of the vapor path. The maximum allowable leak rate for nozzles with internal vapor valves during this factory performance test shall not exceed the following:

0.038 CFH at a pressure of at least two (2) inches water column
0.005 CFH at a vacuum of at least forty (40) inches water column.

2. Coaxial Hoses

2.1 Any hose which has any visible puncture or tear equivalent to a diameter of .136 inches (3.5 mm) or greater is defective and shall be immediately removed from service.

2.2 The hoses shall be installed so as to comply with Figure 2G.

2.3 The hose shall not touch the horizontal surface of the island or the ground.

3. Breakaway Couplings

3.1 Breakaway couplings are optional. If they are installed, only CARB-certified breakaways with a valve which closes the vapor path when separated shall be used.

4. VCS400-7 System

The VCS400-7 system operates by maintaining a slight vacuum on the entire system. There are two modes of operation, the Idle Mode and the Dispensing Mode. The Dispensing Mode takes effect when one or more of the dispenser switches are turned on. The Idle Mode vacuum level is between 4.2" water column (wc) and 4.3" wc. The Dispensing Mode vacuum level is at least 4.5" wc. The particular vacuum level is controlled with vacuum switches and generated by a regenerative blower. Excess vapors are destroyed by thermal oxidation. The thermal oxidizer, vacuum switches, and regenerative blower are located inside the processor. The system operates above 90 percent efficiency when the vacuum level is at 4.2" wc.

4.1 If the system fails to maintain a vacuum level of at least 4.2" wc for 10 minutes, an alarm will sound, a red lamp labeled ALARM will light, and a paperless recorder will mark the house voltage (approximately 120 VAC) to indicate an abnormal condition. Refer to Sections 5 and 6 of this Exhibit for more information.

4.2 Because the integrity of the system is continually monitored, annual static pressure decay testing is not required. If such testing is conducted, only commercial nitrogen shall be used to take the tanks from the operating vacuum level to the test pressure of 2" wc.

4.3 The VCS400-7 system shall operate with a certified processor unit specified in Exhibit 1 capable of meeting an air to liquid (A/L) ratio specified below. The A/L ratio of the system, measured at a flowrate of at least six gallons per minute (6 gpm), shall be within the values listed in the following table. Any fueling point not capable of demonstrating compliance with this performance standard shall be deemed defective and removed from service. The A/L ratio shall be determined by using the CARB-approved procedure TP-201.5. Alternative test procedures may be used if they are determined by the Executive Officer, in writing, to yield comparable results. Figure 2H illustrates the correct method for using the A/L adapter.

A/L Ratio

Flow Rate	Minimum A/L Ratio
6 to 8 gpm	1.45
8 to 10 gpm	1.35

NOTE: This test procedure returns air rather than vapor to the storage tank, and may cause an increase in storage tank pressure and/or affect process unit operation. Temporary conditions which are attributable to the test are not to be considered an indication of malfunction or noncompliance.

4.4 The VCS400-7 processor consists of a regenerative blower; Idle Mode (Lesser), High Flow (H.F.), and Dispensing Mode (Greater) vacuum switches; pilot, main, and High Flow solenoid valves; a Dual rate thermal oxidizer; and combustion safeguard.

4.5 The system capacity of the processor is a function of the actual in-use air to liquid (A/L) ratio and station throughput. If the system capacity is exceeded, an alarm will be sounded, a red lamp labeled *ALARM* will light, and the paperless recorder will mark the house voltage (approximately 120 VAC). Refer to Section 6 of this Exhibit for the procedures to be followed when an alarm is activated.

4.6 The horizontal distance between the pressure/vacuum valve and the processor shall be not less than twenty (20) feet. The processor shall be installed in accordance with the manufacturer's installation manual and applicable fire regulations.

4.7 No dispensing shall be allowed when the processor unit is turned *OFF* unless the facility is operating under a district variance or upset/breakdown rule provision.

4.8 The preferred location for the processor unit shall be a building roof, canopy roof, or pedestal. The location of the processor unit shall be subject to the approval of the local fire authority.

4.9 OSHA-approvable access to the process unit shall be provided immediately upon request by a representative of the local district. Note: the processor unit is a sealed unit. The system vacuum status is indicated by the system monitor.

4.10 The VCS400-7 system is automatic and self-diagnostic. Should the system fail to maintain the operating vacuum level, either by failure of the pilot to ignite or due to excessive air leaks anywhere in the system, the red lamp labeled *ALARM* will light alarm and the recorder will mark the house voltage (approximately 120 VAC).

4.11 The VCS400-7 system shall be installed and wired such that no dispensing can occur unless the monitor is ON and operational.

5. Control Panel

5.1 The VCS400-7 system shall have an operable control panel. (refer to Figure 2B). The panel shall have clearly labeled indicators, which light to indicate when the processor is operating properly. See VCS400-7 Manual of Operation and Maintenance for meaning of control panel lamps, horn, and paperless recorder indicators.

5.2 Each control panel shall have instructions readily available to station personnel on how to operate the panel. These instructions shall include the meaning of lamps, horn and paperless recorder indicators.

5.3 The control panel shall record, with date and time, and store for 365 days, the length of time the system operates with a vacuum level of at least 4.2 inches water column, and the length of time the system operates with a vacuum level below 4.2 inches water column for periods longer than ten (10) minutes.

5.4 The paperless chart graph keeps a record of the vacuum in the system. If the system is functioning normally, then the paperless unit will record (0) Volts AC at the sample rate of one per minute (See Figure 2F). If there is a condition which does not allow a vacuum of at least 4.2 inches water column to be maintained for

at least ten (10) minutes, then the paperless unit will record approximately (120) Volts AC at the sample rate of one per minute (see Figure 2F). See Section 6 for the procedures to be followed when an alarm is activated.

5.5 All necessary system vacuum status data shall be available to an inspector at the control panel. The inspector shall check the sample rate, scale time, date, set password, and start record mode for paperless recorder prior to system start-up. See VCS400-7 Manual of Initial and Annual Inspection for detailed instructions.

6. Alarm (Audible Horn and Red Lamp)

6.1 The VCS400-7 system shall include an audible alarm which shall sound if any of the following conditions have occurred:

- System fails to achieve a vacuum of at least 4.2 inches water column within 15 minutes of start-up.
- System fails to maintain a vacuum of at least 4.2 inches water column for more than (10) minutes during normal operation.
- One hour has elapsed since alarm silence push-button has been depressed and system has not reestablished a vacuum of at least 4.2 inches water column.

6.2 The audible alarm shall be located such that it can easily be heard by station personnel in the area most likely to be occupied during normal station operation (i.e., at the cash register).

6.3 Temporary and extended abnormal conditions will result in an alarm. The system will automatically recover from a temporary abnormal condition, but the system will need a physical correction to recover from an extended abnormal condition.

a) Some examples of **temporary abnormal conditions** that could cause an alarm are:

1) Failure of the Phase I system component such as a leaky vapor return hose or a vapor return elbow that will no longer completely depress the vapor poppet.

2) Failed components on the bulk delivery truck such as a relief valve with a worn gasket or a loose Phase I system vapor hose adapter.

3) Any improper Phase I system connection and/or disconnection procedure (s) that allow atmospheric air to be ingested by the systems' operating vacuum.

4) Holding a spill valve open too long after the spilled gasoline drains back to the storage tank.

b) Some examples of **extended abnormal conditions** that can cause an alarm are:

1) Failure of a component at the gasoline dispensing facility such as a cut dispensing hose, a bad ignition module in the process unit, or a broken Phase I system vapor poppet.

2) Loose Phase I system adapters, debris stuck in the spill valve(s), drop tubes that leak, or debris in the P/V valve.

3) Installations that do not meet certification requirements.

6.4 In the event that the audible alarm sounds, the red lamp labeled *ALARM* lights, and the paperless recorder marks the house voltage (approximately 120 VAC), follow the process below:

a) Press the button labeled *ALARM SILENCE* located on the control panel to silence the audible alarm. The facility operator should inspect the vapor recovery system for cut dispensing hoses, loose Phase I system components, leaky spill valves, or any other component which is allowing the system vacuum to ingest atmospheric air. If a physical correction is made it should be noted in a facility logbook.

b) Allow the system (1) hour to automatically re-establish operating level vacuum.

c) If, after an hour, the audible alarm sounds again, the operator must call to arrange service on the vapor recovery system within 24 hours.

d) The service technician is to determine the cause of the alarm.

e) If the alarm is related to at least one failed part, the operator must follow procedures for breakdown rule provision and the service technician should make the repairs.

f) If the alarm is not related to a failed part, then the operator should write an explanation of the physical correction required into the facility logbook.

7. Pressure/Vacuum Valves for Storage Tank Vents

A pressure/vacuum (P/V) valve shall be installed on each tank vent. Vent lines may be manifolded provided the manifold is installed at a height not less than 12 feet above the driveway surface used for Phase I tank truck filling operations. At least one P/V valve shall be installed on manifolded vents. If two P/V valves are desired, they shall be installed in parallel, so that each can serve as a backup for the other if one should fail to open properly. The P/V valve shall be CARB-certified as specified in Exhibit 1, and shall be installed so as to ensure that any venting from the system will occur only when the P/V valve settings are exceeded. The outlets shall vent upward and be located to eliminate the possibility of vapor accumulating or traveling to a source of ignition or entering adjacent buildings.

8. Vapor Recovery Piping Configurations

8.1 All vapor return lines shall slope a minimum of 1/8 inch per foot. A slope of 1/4 inch or more per foot is recommended wherever feasible.

8.2 The dispenser shall be connected to the riser with either flexible or rigid material which is listed for use with gasoline. The dispenser-to-riser connection shall be installed so that any liquid in the lines will drain toward the storage tank. The internal diameter of the connector, including all fittings, shall not be less than five-eighths inch (5/8").

8.3 The nominal inside diameter of the vent lines shall be two inches (2”). One 3/4” NPT pipe can accommodate the vapor from no more than 1 bootless nozzle. One 1” NPT pipe can accommodate the vapor from no more than 2 bootless nozzles which can dispense simultaneously. One 2” NPT pipe can accommodate the vapor from no more than 5 bootless nozzles which can dispense simultaneously. To accommodate vapor from 6 or more simultaneously dispensing bootless nozzles, use 3” NPT pipe. All vapor lines shall allow unobstructed passage of vapor as appropriate in normal operation of the system. The ideal arrangement of vapor piping is shown in Figure 2A. Consult the VCS400-7 Manual of Installation and Start-up for alternate arrangements.

8.4 All vapor return and vent piping shall be, at a minimum, installed in accordance with the manufacturer's instructions and all applicable regulations.

8.5 All vapor collected by the nozzles must pass through the ullage of at least one storage tank before reaching the processor. Thus, the vapor return piping (coming from the dispensers) and the piping leading to the processor must be connected to the storage tank at two separate locations. The horizontal separation between the tank fitting for the vapor return piping and the tank fitting for the processor piping must be at least 2 feet. See Figure 2A.

8.6 Pressure gauge is to be installed in the dispensing housing located furthest from the vent risers.

9. Storage Tank and Phase I System

WARNING: Phase I fill caps should be opened with caution because the storage tank may be under pressure. Note: the system normally maintains a vacuum in the storage tanks; pressure in the storage tanks would occur only in the event of system malfunction.

9.1 The VCS400-7 system may be installed only in facilities in which the relationship between the drop tubes and the product pickup points comply with the specifications contained in Figure 2D. Other configurations will cause the system to ingest excess air when the gasoline level is low.

9.2 The Phase I system shall be a CARB-certified system which is in good working order. Coaxial Phase I systems shall not be used with new installations of the system. Replacement of storage tanks at existing facilities, or modifications which cause the installation of new or replacement Phase I vapor recovery equipment, are considered new installations with regard to this prohibition. An exception to this

prohibition may be made for coaxial Phase I systems CARB-certified after January 1, 1994, as compatible for use with Phase II systems which require pressure/vacuum vent valves.

- Where installation of the VCS400-7 system is made by retrofitting previously installed equipment, local districts may elect to allow existing coaxial Phase I systems to remain in use for a specifically identified period of time provided the following conditions are met:

- the existing coaxial Phase I system is a poppeted, CARB-certified system capable of demonstrating compliance with the static pressure decay test as specified above; and

- installation of the Phase II system requires no modification of the UST(s) and/or connections.

9.3 Spill containment manholes which have drain valves shall be maintained in leak-tight condition. Manholes with cover-actuated drain valves shall not be used in new installations (as defined above). Drain valves may be removed and the port plugged provided an alternate method of draining the spill container is defined (i.e., a hand pump maintained at the facility and/or on the product delivery trucks).

9.4 The Phase I vapor recovery system operates under a vacuum. Product deliveries are to be performed in a manner which prevents the system from ingesting excess air. There shall be no less than one vapor return hose connected for each product being delivered. Provided it is not in conflict with established safety procedures, this may be accomplished in the following manner:

i) For two-point Phase I systems, the vapor return hose is connected to the delivery tank and to the delivery elbow before the elbow is connected to the facility storage tank;

ii) The delivery tank is opened only after all vapor connections have been made, and is closed before disconnection of any vapor return hoses;

iii) The existing Phase I equipment is in good working order; and

iv) The vapor return hose is disconnected from the facility storage tank before it is disconnected from the delivery tank.

9.5 During Phase I transfer operations, there shall be no more than two Phase I product hoses used with Phase I vapor hose connected, and no more than three product hoses used with two vapor hoses connected.

9.6 Storage tank vent piping shall be maintained white, silver or beige. Colors, which will similarly prevent heating of the system due to solar gain, may also be used, provided they are listed in the EPA AP-42 as having a factor the same as or better than that of the colors listed above.

9.7 Manholes shall be maintained in a color, which minimizes solar gain, as specified above. Manhole covers, which are color coded for product identification, are exempted from this requirement.

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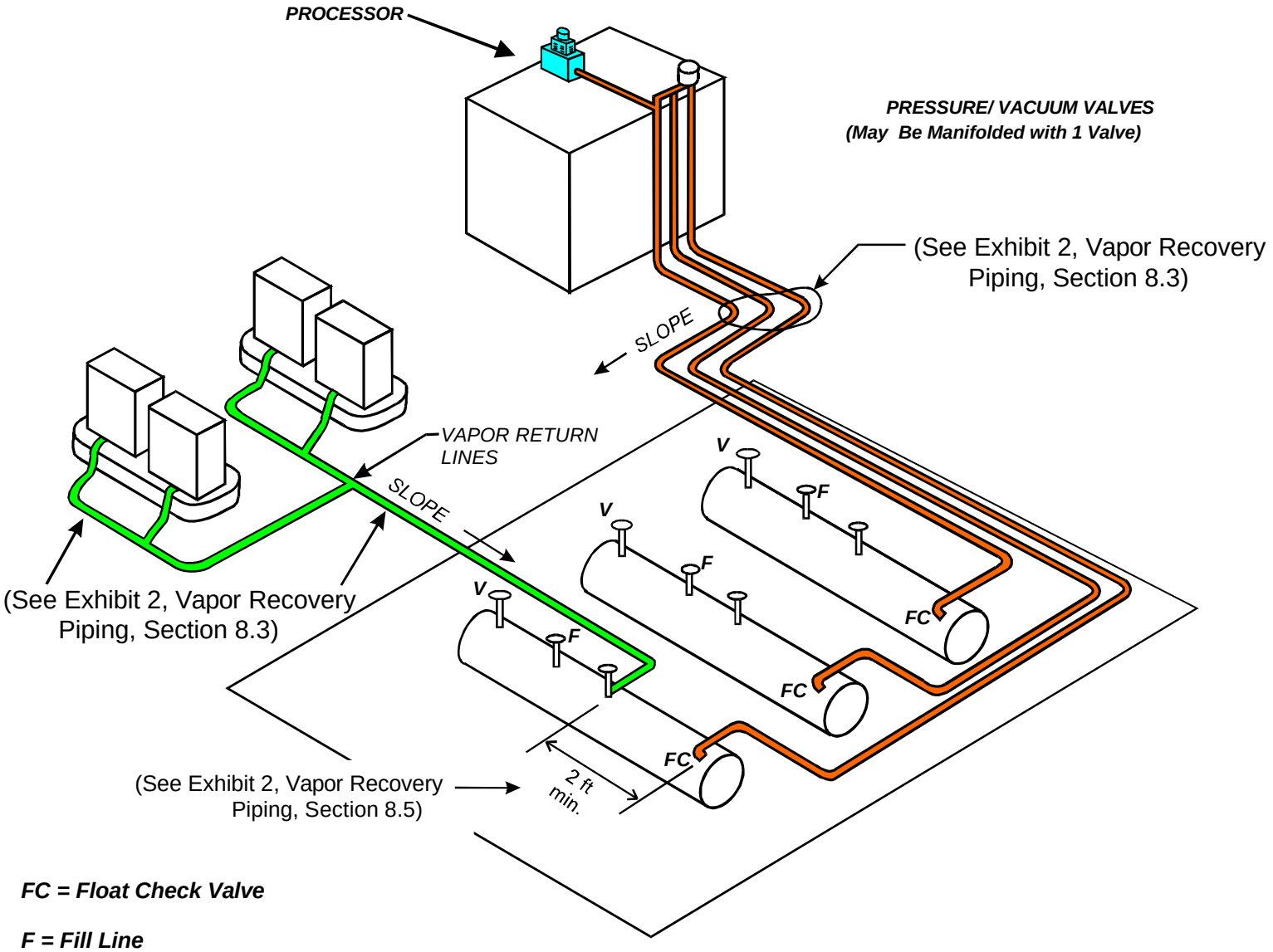
Exhibit 2

Figure 2A

Typical Installation of the
Hirt VCS400-7 Vacuum Assist
Phase II Vapor Recovery System



FC = Float Check Valve

F = Fill Line

V = Phase I Vapor Recovery

Note: 1. All Vapor/Vent Lines are 2" Nominal ID Minimum Except as Noted

2. Slope: 1/8" per foot Min.
1/4" per foot Preferred

3. Maintain 2'0" Clearance Between Fill Line and Phase I Vapor Return Line to Delivery Truck

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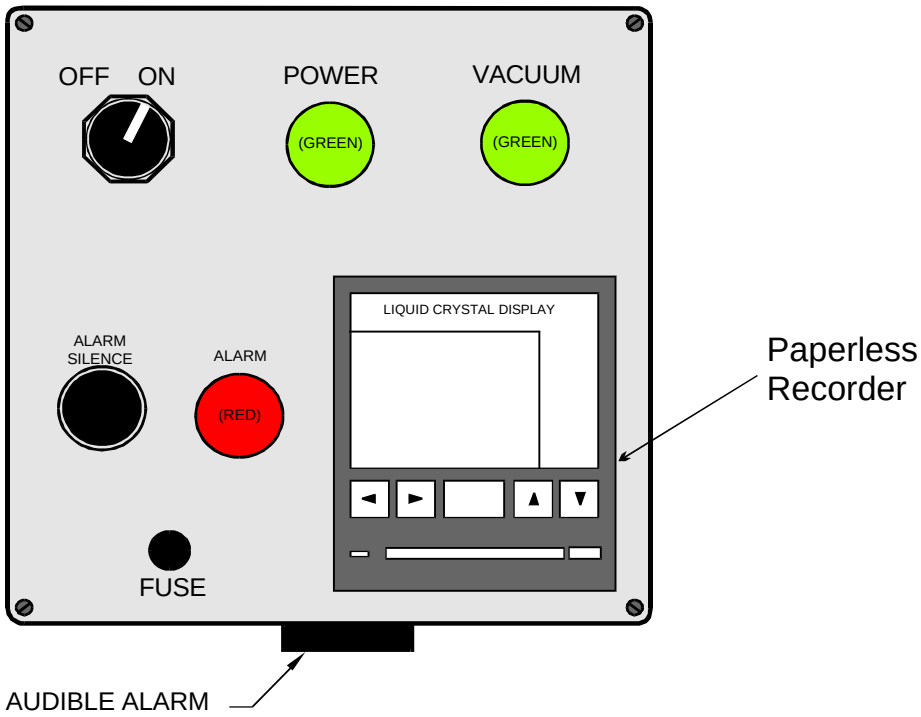
Exhibit 2

Figure 2B

Control Panel Configuration



Alternate Panel Configuration

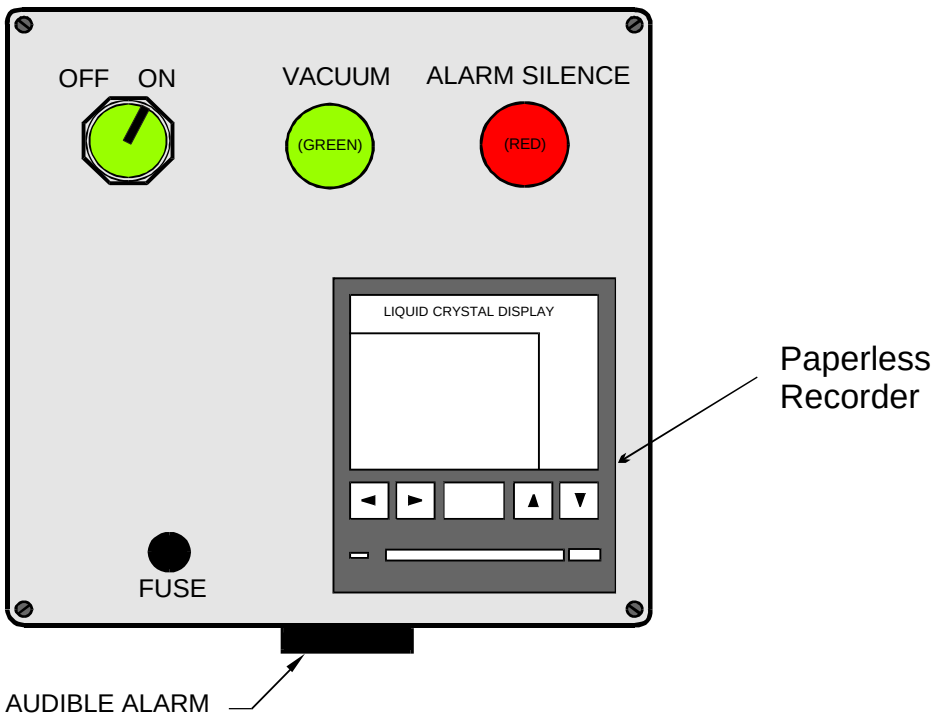


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Exhibit 2
Figure 2C

OPW Model 11VA-29 with Stainless Steel Spout for Hirt VCS400-7 System

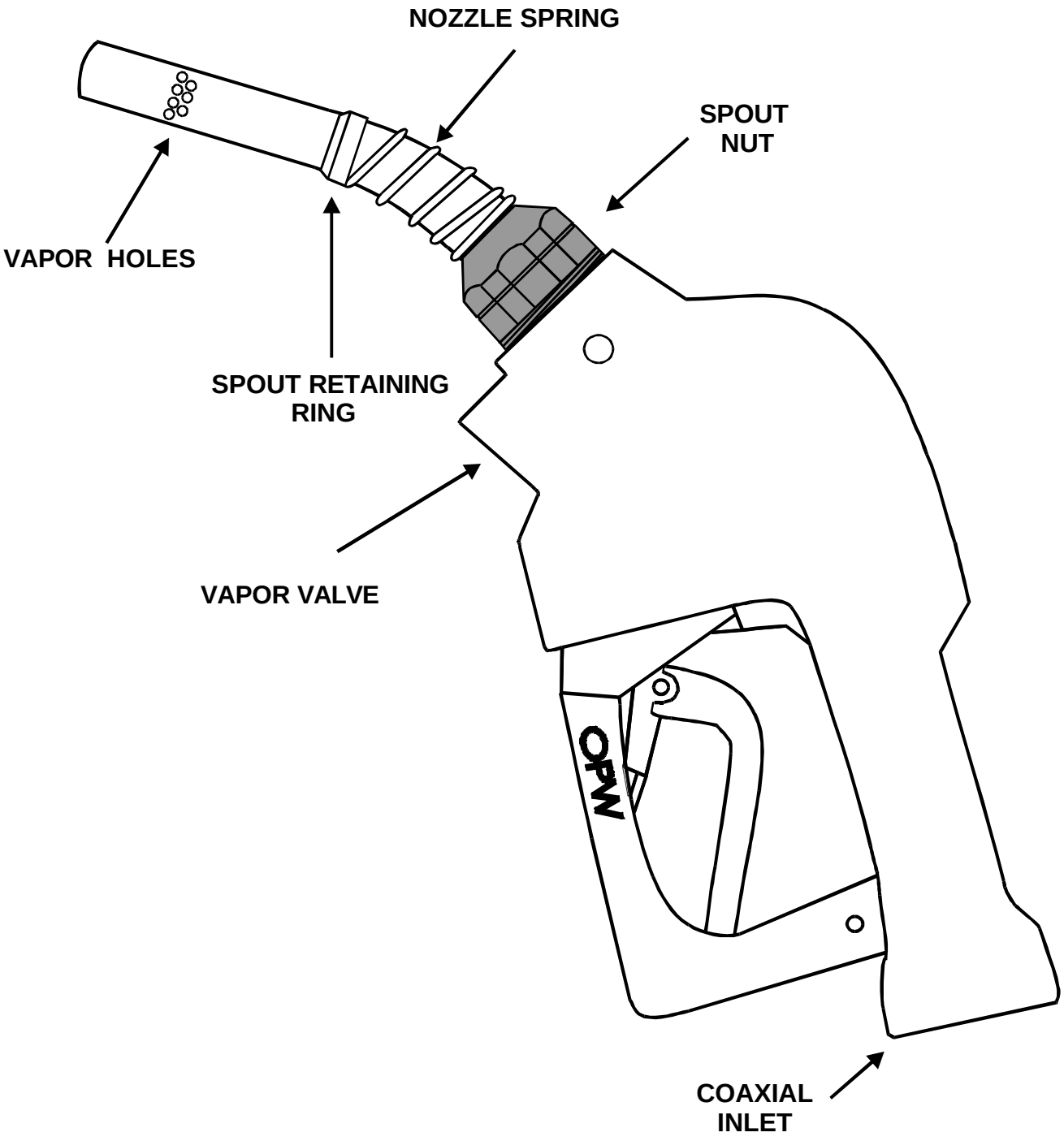

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Exhibit 2

Figure 2D

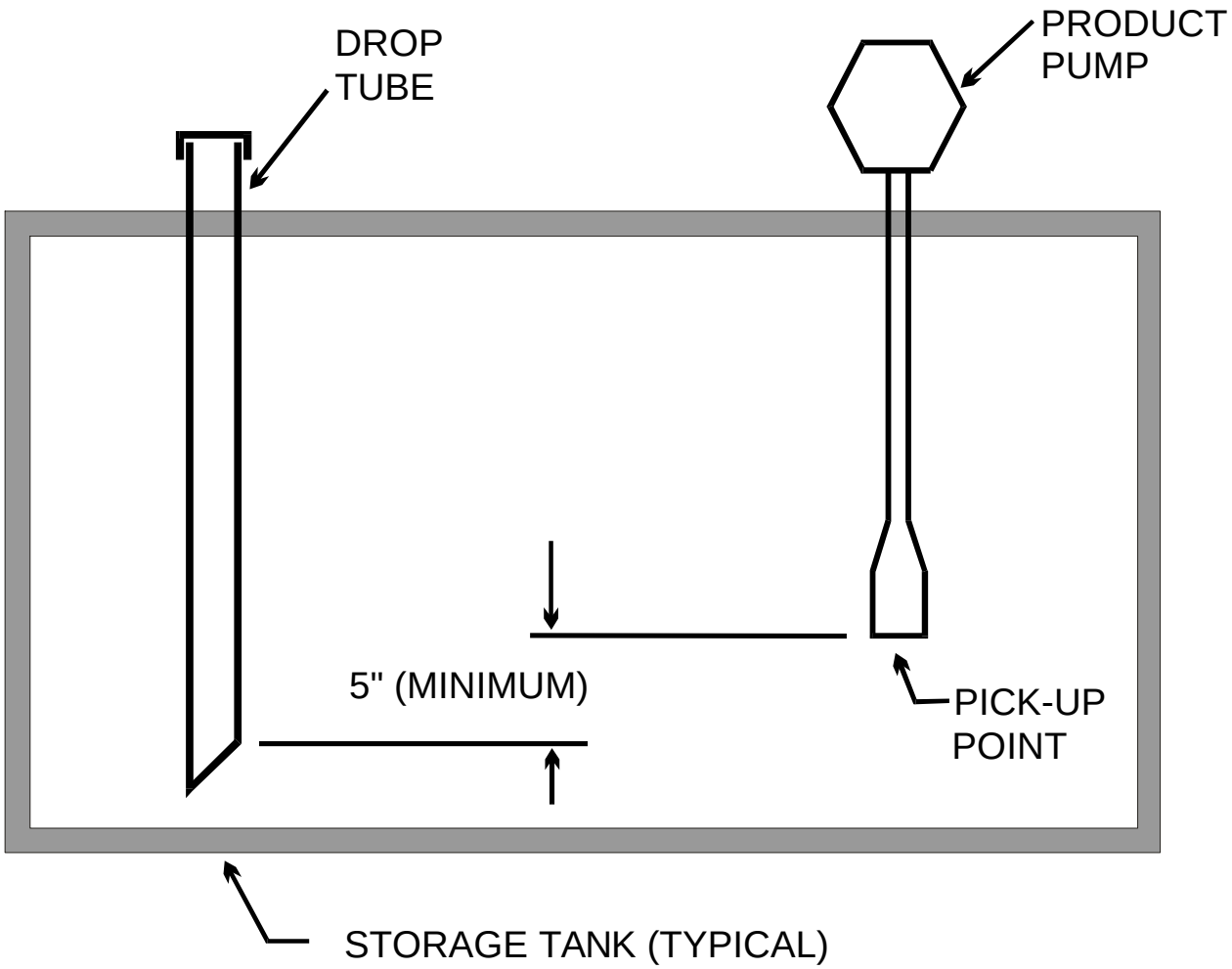

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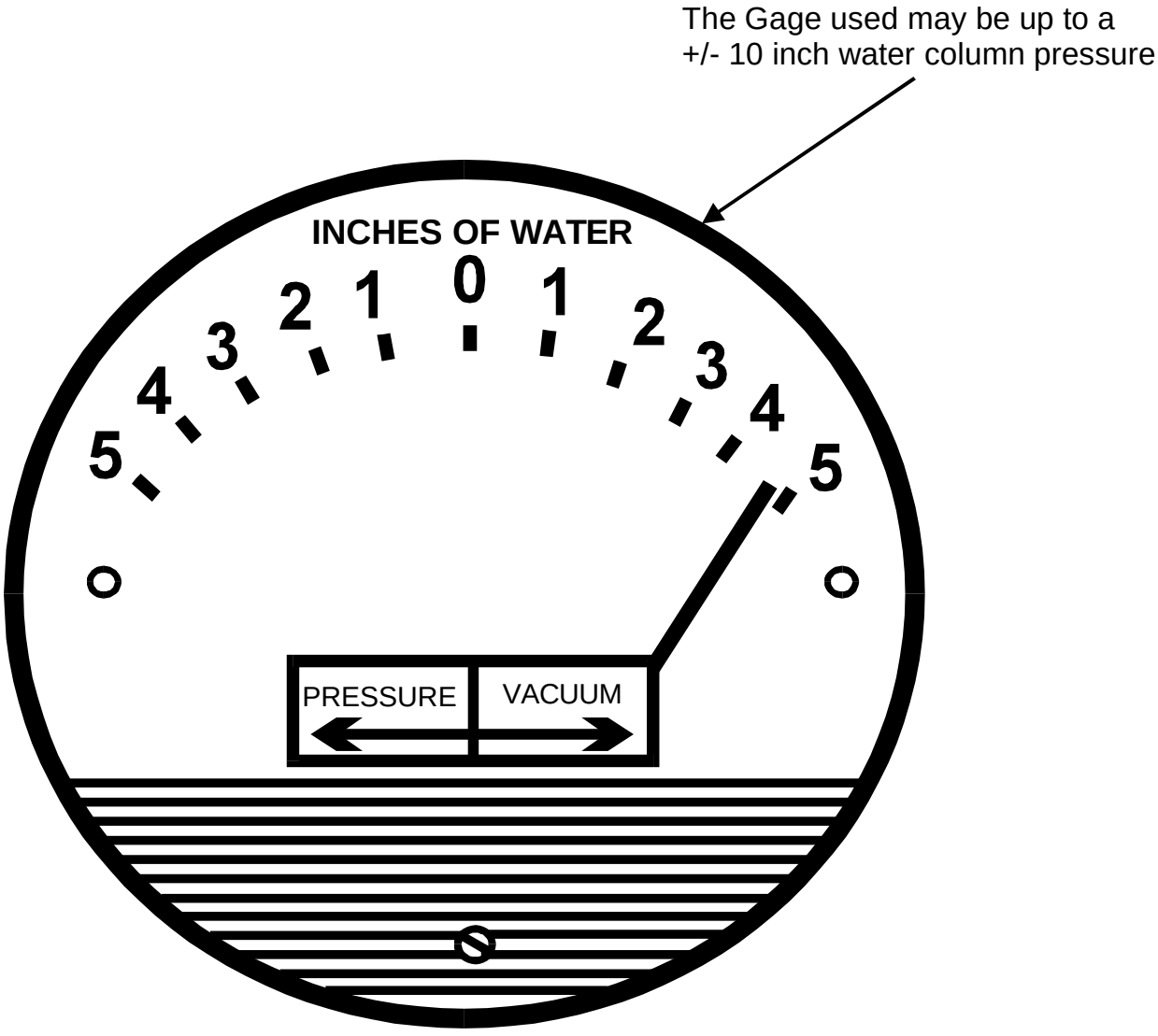
Exhibit 2

Figure 2E



Note Pressure/Vacuum Gage is usually installed in the dispenser house located furthest from the vent riser

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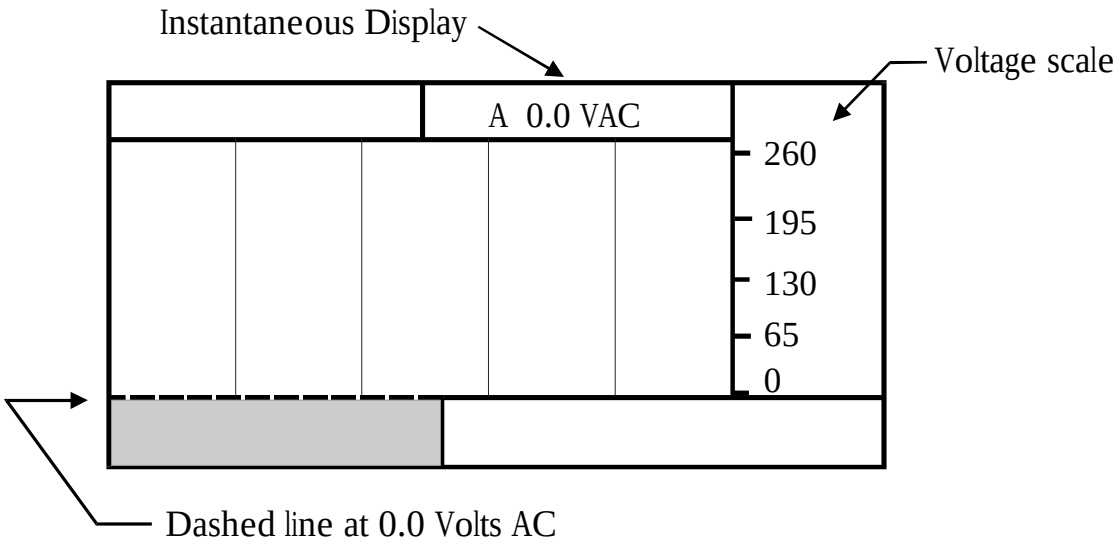
Exhibit 2

Figure 2F

Normal Trace



Abnormal Trace

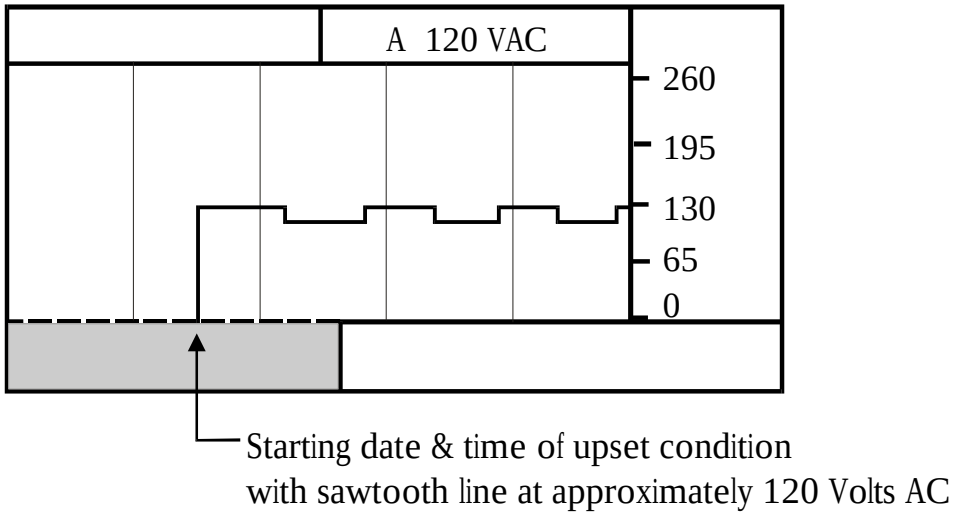


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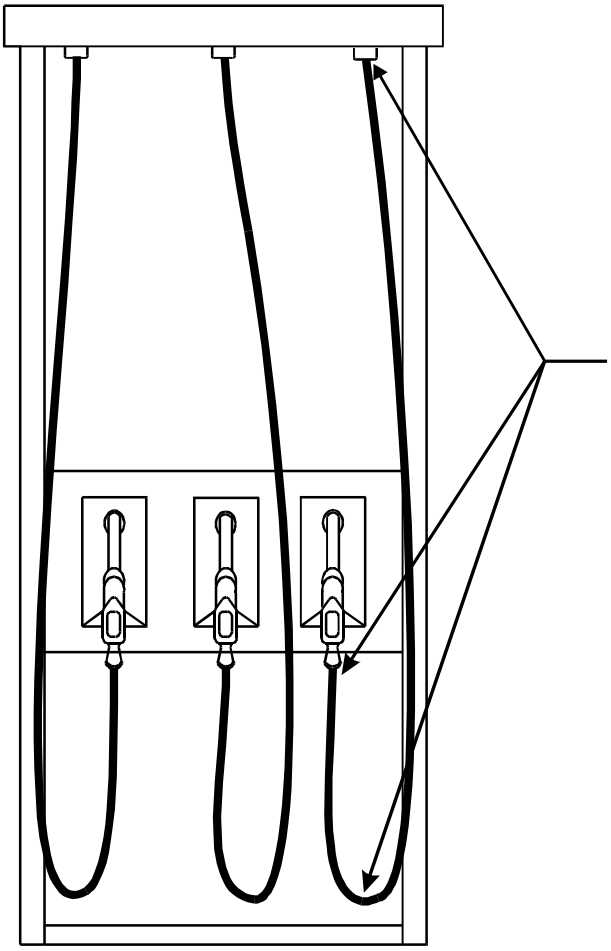
Exhibit 2

Figure 2G



Venturi may be located at <u>one</u> of the following three locations:

a) at the dispenser interface

b) at the nozzle end of the hose

c) at the low point of the hose

Note: Liquid Removal System required so that the liquid pickup is located at the low point of the hose loop during vehicle fuelings

NOTES:

1. Use 1 inch or larger inside diameter galvanized pipe for riser.
2. The maximum length of the hose assembly is 10-1/2 feet.
3. An ARB certified Liquid Removal System must be installed and maintained according to the manufacturer's current specifications.
4. A Flow Limiter is required on all dispensers that have a maximum flowrate in excess of 10gpm.
5. The hose may not touch the island or the ground when not in use. In the case of a dogbone island where the wider island ends protect the hose from damage by vehicle tires, the hose may touch the vertical face of the dogbone island at the option of the local air pollution control district.

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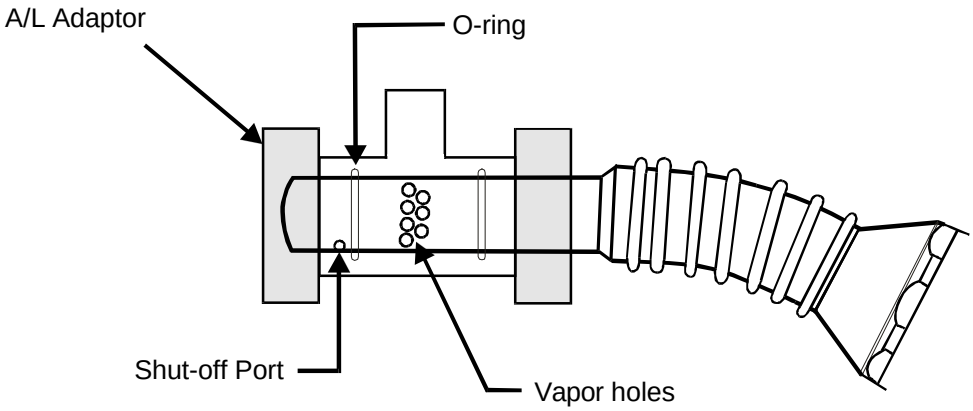
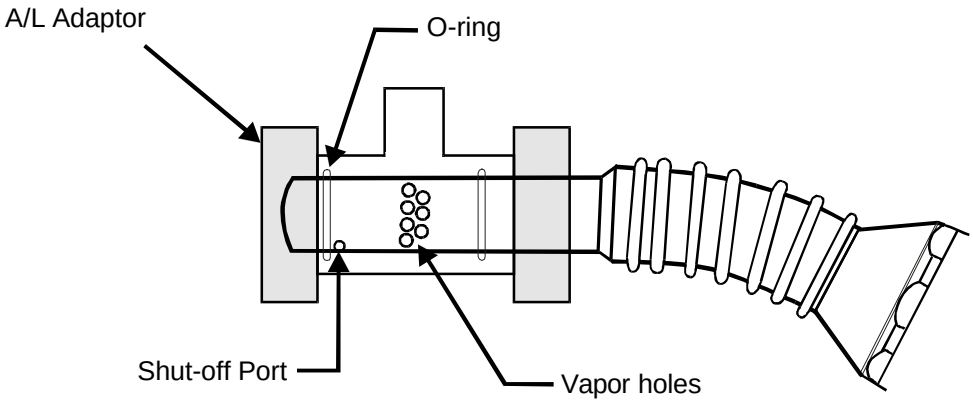
Exhibit 2
Figure 2H

Proper Installation of the A/L Adaptor

Correct Installation: Note that the o-ring has isolated the shut-off port from the vapor holes



Incorrect Installation: Note that the o-ring includes the shut-off port with the vapor holes



EXECUTIVE ORDER G-70-177-AA

EXHIBIT 3

TEN GALLON PER MINUTE LIMITATION
COMPLIANCE VERIFICATION PROCEDURE

Compliance with the 10 gallon per minute flowrate limitation shall be determined with the following methodology. It is recommended that the maximum dispensing rate through each nozzle/hose assembly be verified.

1) The facility uses identical models of hoses, nozzles, and breakaways:

Dispense gas into a vehicle or approved container. Dispensing shall be conducted in the "hand-held, wide-open" mode. Using a stopwatch accurate to at least 0.2 seconds, begin timing the dispensing rate after at least one gallon has been dispensed. This one gallon buffer is necessary due to the "slow-start" nature of some dispensers. Determine the time required to dispense 2, 3, 4, or 5 gallons of gasoline. The facility shall be deemed in compliance with the 10 gallon per minute limitations if the elapsed time meets, or exceeds, the times shown in Table 1. If the dispensing rate exceeds the allowable limit, a CARB-certified flow limiting device shall be installed.

2) The facility uses different models of hoses, nozzles, or breakaways

Due to potential differences in pressure drops through the various components, each of the nozzle/hose assemblies shall be tested for maximum dispensing rates. Using the same criteria as above, determine the maximum dispensing rate through each nozzle/hose assembly. If the maximum dispensing rate exceeds the 10 gpm limit, a CARB-certified flow limiting device shall be installed.

Table 1
Verification of 10 gpm

Product Dispensed, gallons	Minimum Allowable Time, seconds
2.0	11.8
3.0	17.7
4.0	23.6
5.0	29.5

Note: The times have been corrected to allow for the accuracy of the measurement.